



## D2 | 1.2379 | SKD-11

This is a high chromium tool steel specifically designed to provide a high abrasive wear resistance and a high hardenability.

The grade is delivered in annealed condition to keep a good machinability. After machining it requires a hardening to achieve its service properties. The adjustment of hardness should be done to get the best compromise between toughness and wear resistance.

This grade can be used for cutting and deformation tools submitted to high abrasive wear. It can be used when 2% carbon steels (D3 type) shows an excessive sensitivity to cracking or chipping.

## CHEMICAL COMPOSITION

W.nr	EQUIVALENT			C	Si	Mn	S	P	Cr	Mo	V
	JIS	DIN	AISI/ASTM								
1.2379	SKD11	X155CrVMo12-4	D2	1.45-1.6	0.10-0.60	0.20-0.60	<0.03	<0.03	11.00-13.00	0.70-1.00	0.70-1.00

## PROPERTIES

Physical Properties	Metric	Imperial
Density	7.7 x 1000 kg/m <sup>3</sup>	0.278 lb/in <sup>3</sup>
Melting point	1421°C	2590°F

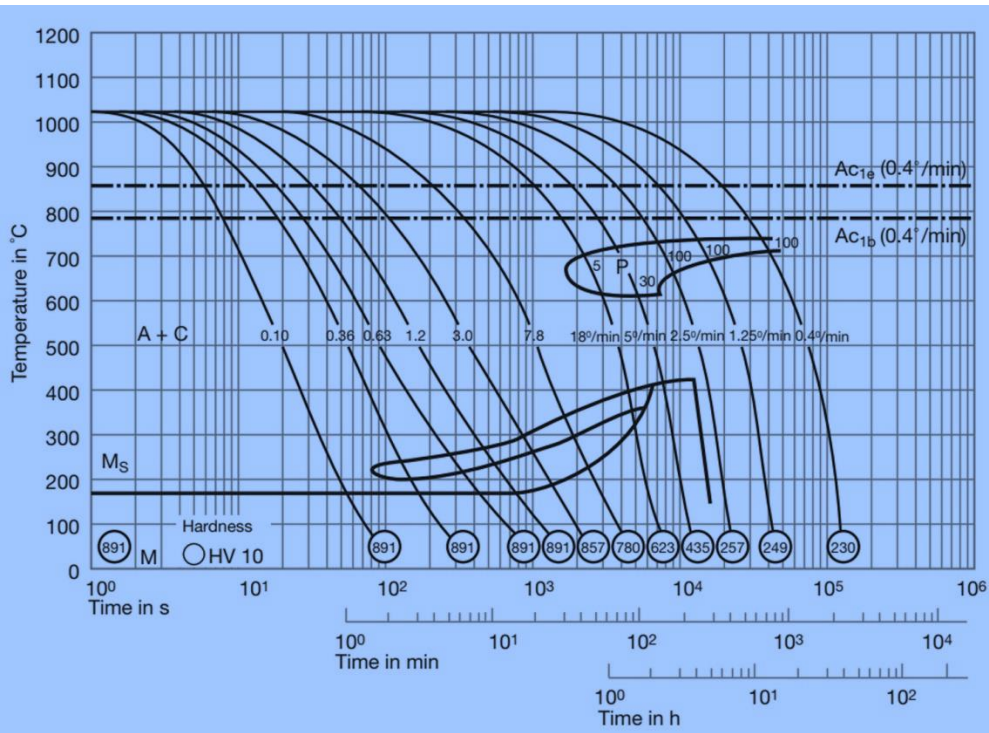
Mechanical Properties	Metric	Imperial
Hardness, Knoop (converted from Rockwell C hardness)	769	769
Hardness, Rockwell C	62	62
Hardness, Vickers	748	748
Izod impact unnotched	77.0 J	56.8 ft-lb
Poisson's ratio	0.27-0.30	0.27-0.30
Elastic modulus	190-210 GPa	27557-30457 ksi

Thermal Properties	Conditions	
	T (°C)	Treatment
Thermal expansion	10.4 x 10 <sup>-6</sup> /°C	20-100
		-

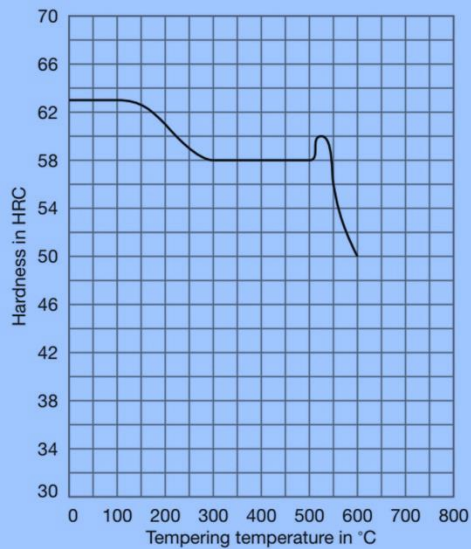
## Heat Treatment

TREATMENT	TEMPERATURE	HOLDING TIME (HT)	COOLING	HARDNESS (HB)
Annealing	Heat to 840 – 870 °C	Min. H.T. for 2 minute /mm	Furnace	MAX250
Stress relieving	Heat to 660 – 710 °C	Min. H.T. for 2 minute /mm	furnace	-
Hardening	Heat to 1000 – 1050 °C	Min. H.T. for 1 minute /mm	Air, oil or saltbath, 500 – 550 °C	-

### Time-temperature transformation diagram Hardening temperature: 1030 °C



## Tempering diagram



## APPLICATION

Typical applications for D2 Steel:

- Stamping or Forming Dies
- Punches
- Forming Rolls
- Knives, slitters, shear blades
- Tools